

1

3,084,133

## TAPE JOINT CEMENT COMPRISING POLYVINYL ALCOHOL AND CLAY AND METHOD FOR PREPARING SAME

Julius Sirota, South Plainfield, and Benjamin D. Jubilee, Plainfield, N.J., assignors to National Starch and Chemical Corporation, New York, N.Y., a corporation of Delaware

No Drawing. Filed Sept. 22, 1959, Ser. No. 841,446  
11 Claims. (Cl. 260—29.6)

This invention relates to a tape joint cement, and to a novel method for making such a cement. It is our object to provide a dry tape joint cement composition which mixes more readily with water, as compared to heretofore known compositions, to form a workable cement. Our further object is to provide such a dry composition which requires less water to achieve a workable consistency, and thus results in a cement of higher solids content. Another object is to provide a tape joint cement which, after application and drying, is less subject to shrinking and cracking than materials heretofore employed. Still another object is to provide a tape joint of excellent binding power, which will form a surface, when applied and dried, that is readily sanded and coated with paint or wallpaper.

We have found that the above and other notable improvements are achieved by employing a new type of binder, and more particularly by a novel method of incorporating the binder in the dry cement composition.

The trend in modern housing construction is toward the use of wall board in place of lathing and plaster. When wall boards are put up, there is necessarily a certain space between them. Even though this space be only a fraction of an inch, it is essential that the gaps be filled, or bridged, in order that a smooth wall be obtained, unmarred by seams.

The most common practice has been to apply a tape, and a tape joint cement, over the seams between the wall boards. The tape joint cement is ordinarily sold and distributed in the form of a dry mixture comprising a major portion of an inert filler and a minor portion of a binder. At the point of use, the compound is mixed with water until a suitable working consistency is obtained. A soft, spreadable, but non-flowing mass is ordinarily desired. This cement is then applied over the gaps between the boards, and spread for an inch or two on either side of the gaps. After a section of the wall has been thus treated, a perforated tape is pressed onto the still wet cement, so that it is embedded therein. Sometimes an additional application of the tape joint cement is made over the tape. When dry, the joints are smoothed down, so that a perfectly even, seamless wall remains.

The filler portion of the cement composition is ordinarily clay, or any one of a number of other inert, relatively inexpensive materials such as dolomite, ground limestone, asbestos, mica, silica and the like. The binder is the more important component of the cement, since it serves to bind the ultimate applied cement so that it does not crumble to a powdery mass, and it must also serve to keep the paper tape powerfully embedded in the cement. It also functions, of course, as the adhesive to bond the

2

cement to the wall board. Powdered casein has been the binder hitherto most commonly employed, but it suffers from certain disadvantages. Thus, when a dry casein-clay tape joint cement composition is stirred with water, to form the usable cement, a half hour or more is required before the cement composition has been thoroughly dispersed and "tempered" so as to attain a smooth, workable viscosity. This is partly due to the fact that casein does not disperse readily in cold water, but first goes through a period of swelling and peak viscosity, and then only gradually disperses in the water and drops to a relatively stable viscosity. In this respect it resembles most polymeric materials, natural and synthetic, which go through a stage of swelling and peak viscosity before actually dispersing in water. Animal glues, natural gums, and the so-called water soluble high polymeric resins are other examples of this type of slow dispersing material. The time consumed in dispersing a tape joint cement, when taken in terms of production delays and labor costs, is an obviously important factor.

Another disadvantage of casein, and other binders of the type heretofore used, is the relatively large amount of water required to form a dispersion of suitable viscosity. Thus, a typical casein-clay mix containing 10% of casein and 90% of clay, by weight, requires the use of about 65 parts of water per 100 parts of the casein-clay mix, to obtain a dispersion of workable viscosity. The presence of that much water (or, conversely, the relatively low solids content of the cement) greatly enhances the probability of shrinking of the cement mass as it dries, with resultant formation of cracks on the surface. Such cracks defeat one of the purposes of the tape joint cement, namely, to provide a smooth wall over which paint may be applied. This is, of course, in addition to the disadvantages already named—difficulty of dispersion, viscosity variation, etc. Still another difficulty is the excessive spoilage encountered with materials such as casein, which are susceptible to bacterial attack and mold formation.

In seeking replacements for casein, as a binder in tape joint cements, it is necessary to restrict oneself to those which are strong, film-forming binders. If the binder were relatively weak, it would be necessary to use so large a proportion that the amount of clay (or equivalent filler) would be relatively low. This would affect not only the physical properties of the resulting cement, including its rheological characteristics, but also its economic feasibility. The binder should also be one which possesses a rather unusual combination of properties, namely water dispersibility together with the ability to form relatively water resistant dried films.

Among the strong, water-dispersible binders which we have tried for this purpose is polyvinyl alcohol. Polyvinyl alcohol is the product resulting from the hydrolysis of polyvinyl acetate or other polymerized vinyl esters of organic acids. It is available (or can be made) in various degrees of hydrolysis—that is, ranging from products wherein the polyvinyl ester has been only partly hydrolyzed, to those wherein the ester has been 100% hydrolyzed, resulting in a substantially pure polyvinyl alcohol with no residual ester groups. We have found that hydrolyzed polyvinyl esters of organic acids (as for